Journal of Accounting, Entrepreneurship, and Financial Technology (JAEF) p-ISSN: 2686 - 4479
Volume 08, Number 01, October 2026 e-ISSN: 2686 - 5505

Behavioral Biases and Government Bonds Investment Decisions Across Generations: The Mediating Role of Risk Perception

Verrell Sutanto*, Cliff Kohardinata
Universitas Ciputra Surabaya

Abstract: Investor behavior in making investment decisions is not always rational because it is affected by multiple behavioral biases. The influence of these biases can vary across generations as a result of differing characteristics, investment preferences, and risk perceptions. This study investigates the impact of behavioral biases on investment decisions in government bonds, with risk perception as a mediating variable, and to compare this relationship between Generation X and Generation Y (Millennials). This study utilized a quantitative approach, with a sample of 444 individual investors who are customers of large capitalization banks with high levels of government bond absorption in Indonesia selected using purposive sampling techniques. Data were collected through questionnaires that met validity and reliability tests. The analysis was conducted using Multi Group Mediation Analysis (Sub Sample Analysis) through Baron and Kenny's Path Analysis approach to examine direct and indirect relationships across the entire sample and each generational group. The empirical findings suggest that behavioral bias plays a significant role in shaping government bond investment decisions. Furthermore, risk perception is proven to partially mediate the relationship between behavioral bias and investment decisions, both in the overall sample and in the subsamples of Generation X and Generation Y. The findings from the multigroup analysis indicate that the relationships between the variables vary in magnitude across Generation X and Generation Y. This study underscores the importance of considering both behavioral factors and generational characteristics in the development of marketing strategies, education, and developing government bond investment products.

Keywords: behavioral bias, investment decision, government bonds, risk perception, generational gap

Received: *15 June 2026,* ***Revised:*** *24 June 2026,* ***Accepted:*** *20 July 2026*

*Corresponding Author.
email: sutantoverrell@gmail.com

INTRODUCTION

The bond market constitutes a fundamental component of the financial system because it provides a channel for governments (government bonds) and companies (corporate bonds) to raise funds, while also offering investors a relatively stable investment alternative compared to equities (Omodero & Alege, 2021). In emerging markets like Indonesia, government bonds are increasingly important for both retail and institutional investors as the government seeks to stimulate the economy. This economic stimulation lies in deepening investment in the capital market while also reducing dependence on foreign debt (Petlele & Buthelezi, 2025). In reality, investment decisions are not solely determined by rational financial analysis; they are often driven by irrational factors influenced by investor psychology (Adil et al., 2022; Ahmad & Shah, 2022).

In theory, investors are expected to behave rationally, basing investment decisions on government bonds using objective indicators, such as yield, duration, risk premium, and macroeconomic prospects (Van Binsbergen et al., 2025; Nie et al., 2021). However, in practice, many investors make decisions that are not aligned with the direction implied by rational analysis (Suresh, 2024). This misalignment leads to oversubscription of government bonds at certain times. According to economic law, bond prices are strongly influenced by interest rates; therefore, investors can expect high uncertainty regarding the trajectory of interest rates (Kim et al., 2024). Bond price volatility is more closely related to rate of interest than other measures related to capital markets and economic policy (Vayanos & Vila, 2021). When there are more government bonds outstanding, investors will demand higher yields (interest) as compensation for absorbing the risk (Adekoya, 2020). The perceived impact on secondary market bonds is a decline in price (Kim et al., 2024).

From August 2022 until the end of the year, the benchmark interest rate experienced a sharp increase as Bank Indonesia adjusted its policy to manage inflationary pressures and external risks (Trading Economics, 2026). Despite this tightening cycle (contractionary monetary policy), the primary government securities (SBN) market remained active. On a full year basis, the average incoming bids during 2023 recorded a significant increase compared to 2022, indicating that investors continued to show strong interest in government bonds even amid higher interest rates (DJPPR, 2023). Furthermore, the bid to cover ratio increased significantly from 2.250-2.450 in Q2 to 42.620 in August and continued at 2.600 in September, before moderating again in Q4 (DJPPR, 2023). This indicates that investor demand exceeded the number of securities offered, reflecting increased interest in government bonds. Furthermore, data shows that in 2022, trading

volume declined during the second and third quarters before recovering strongly in the fourth quarter, and this momentum continued into 2023 (OJK, 2023). This pattern suggests that despite an upward trend in interest rates, demand and transaction activity for government bonds continued to strengthen. This phenomenon cannot be fully explained by traditional financial theory alone, as rational investors typically reduce bond exposure in a rising interest rate environment, often characterized by a hawkish monetary policy (Caravello et al., 2025).

In financial markets, investors may act based on either rational analysis or behavioral biases, and this distinction is extensively examined in both traditional finance and behavioral finance literature (Karki et al., 2024). Traditional finance is built on the premise that investors act rationally and formulate prudent investment decisions (Wang et al., 2024). Investors strive to maximize profits by evaluating the best investment alternatives, even in uncertainty (Karki et al., 2024; Wang et al., 2024; Risman, 2024). Behavioral finance seeks to understand how psychological biases and emotional responses influence investor behavior, resulting in investment decisions that may diverge from rational expectations (Kartini & Nahda, 2021; Vasileiou, 2022; Risman, 2024). Over the past decade, behavioral finance has gained traction in explaining why investors deviate from the rational decision making predicted by classical finance theory (Adil et al., 2022; Ahmad, 2024; Almansour et al., 2023; Suresh, 2024). The behavioral perspective assumes that arbitrage opportunities are constrained and that investors do not always behave rationally (Dierks & Tiggelbeck, 2021).

Deficiencies in technical competence and confidence in their belief may contribute to the emergence of biases that underlie investors' judgment and decision making processes (Sebastião et al., 2024). Investment decisions in everyday life depend on a mix of factors such as tendencies, motives, desires, and social interactions (Suresh, 2024). Various behavioral biases, such as the disposition effect and herd mentality (Adil et al., 2022), as well as heuristic driven bias, framing effect, and cognitive illusion (Suresh, 2024), have been documented to influence investment behavior. Framing theory posits that investment decision making comprises two interrelated stages, namely the framing phase and the evaluation phase (Kühnen et al., 2022). In the framing phase, investors generally formulate decisions based on potential returns rather than the final outcome (Suresh, 2024). Furthermore, amateur investors often use heuristic driven (assumed to be rule of thumb) or simple rules of thumb to make decisions (Ahmad, 2024; Ahmad & Wu, 2024), including a component of overconfidence that describes investors' excessive confidence in the accuracy of their assessments and investment decisions (Adil et al., 2022; Ahmad, 2024; Almansour

et al., 2023; Suresh, 2024). Furthermore, cognitive illusion encourages investors to follow certain norms in investment selection (Suresh, 2024), such as conservatism (slow to adjust to new information), confirmation bias (only seeking and believing information that aligns with initial beliefs), and hindsight bias (assuming that past outcomes could have been easily predicted from the start). Meanwhile, herd mentality leads investors to ignore their own beliefs and instead follow the actions of others in decision making (Adil et al., 2022; Almansour et al., 2023; Suresh, 2024).
H1: Behavioral biases significantly influence investment decisions in government bonds

Behavioral biases have a profound impact on investors' perceptions of risk, often leading to subjective interpretations that deviate from objective ones. Instead of assessing risk based on factual data and statistical probability, investors influenced by biases such as overconfidence, availability, or representation tend to misjudge potential outcomes (Ahmad & Shah, 2022). One key way behavioral biases influence risk perception is through emotional responses and mental framing, as studied by Kim et al. (2022) in the context of the Covid-19 pandemic. In the investment context, the heuristic effect, for example, can cause investors to overestimate the probability of rare but real events, such as a bond market crash due to a pandemic crisis, because such events are more memorable (Botzen et al., 2022). Similarly, the framing effect can cause two identical investment outcomes to be perceived differently, depending on whether they are presented as gains or losses (Monteiro & Bressan, 2021). These distortions shape investors' willingness to engage in or avoid certain investments, regardless of the actual level of risk.

Behavioral biases also create heterogeneity in risk perception across different investor groups (Saivasan & Lokhande, 2022). While some investors may become overly risk averse due to regret, others may underestimate risk due to optimism or herd behavior (Ahmed, et al., 2022). These differences in perception can lead to inconsistent investment strategies and greater volatility in financial markets (Saivasan & Lokhande, 2022). Ahmed et al. (2022) analyzed that the disposition effect always arises because short term investments, rather than long term investments, and investors tend to avoid risk rather than take risk, thus the disposition effect positively influences risk perception. Furthermore, herding behavior predisposes individuals to substitute independent judgment with the observed actions of others when evaluating market risks. In herding situations, individuals who would otherwise act rationally may adopt irrational behaviors by following the decisions of others when they perceive risk to be high (Ahmed, et al., 2022).

H2: Behavioral biases have a significant effect on risk perception

A number of literature reviews emphasize that risk perception is considered as an explanatory factor in understanding how behavioral finance elements are linked to the investment decision making process (Kasoga, 2021; Lathief et al., 2024). Across these studies, risk perception is consistently identified as a mediating mechanism through which behavioral biases exert their effects on investment decisions (Ahmad & Shah, 2022; Almansour et al., 2023). In addition, prior findings highlight that investors who possess greater awareness of both their risk perceptions and behavioral tendencies are less likely to engage in irrational investment behavior, thereby improving decision quality (Wangzhou et al., 2021). Almansour et al. (2023) further demonstrate that a higher level of perceived risk is associated with more cautious investment behavior, indicating a positive relationship between risk perception and investment decision making. Their findings also show that behavioral biases affect investment choices through two channels: a direct effect and an indirect effect that operates through risk perception as a mediating variable (Ahmed, et al., 2022; Almansour et al., 2023; Jain et al., 2023).

H3: Risk perception has a significant effect on investment decisions in government bonds

The few existing studies on behavioral biases are still very limited in integrating an empirical understanding of how behavioral finance manifests differently across generations. In light of the distinct characteristics of Generations X and Y, theoretical considerations suggest potential heterogeneity in behavioral biases influencing investment decision making processes. Generation Y, individuals born between 1981 and 1996, are commonly known as "digital natives" as they represent the first cohort to have grown up with the internet integrated into their everyday lives (Goldring & Azab, 2021). Their strong familiarity with technology has influenced their investment behavior, making them particularly adept at using digital banking services and online investment platforms (Syukur et al., 2025). Their investment preferences tend to be innovation oriented, with a focus on emerging technologies, disruptive industries, and cryptocurrencies. In contrast, earlier generations, especially Generation X, generally prefer a more balanced and diversified investment approach (Goldring & Azab, 2021). For Generation X, allocating investments across a range of asset classes is especially important (Syukur et al., 2025). These differences in background and characteristics across generations underlie the proposed research hypotheses, which are divided into two subsamples: (a) Generation X; and (b) Generation Y. Testing the research

model in these two subsamples aims to determine the significance of the influence of each research variable for each generation.

Based on research from several previous studies (Adil et al., 2022; Ahmad & Shah, 2022; Almansour et al., 2023; Suresh, 2024), it can be seen that there is a knowledge gap reflected in the research results that leave limitations/weaknesses. Although several previous studies have analyzed this topic, these studies still leave several limitations that can be used as a basis for further research: (1) Suresh (2024) has not included risk aversion and disposition effect factors as important dimensions of behavioral biases; (2) several other studies (Adil et al., 2022; Ahmad & Shah, 2022; Almansour et al., 2023) ignore important components of behavioral biases such as heuristics bias, framing effect, cognitive illusions, and herd mentality, so the picture of the influence of investor behavior is still incomplete; (3) few studies have comprehensively examined the effect of behavioral biases on investment decisions, taking into account the mediating role of risk perception (Ahmad & Shah, 2022; Dinarjito, 2023; Nadhila et al., 2024); and (4) there is a gap in adopting a generational perspective on behavioral finance research.

This study uses the Attribution Theory approach to explain behavioral biases, as investors' decisions are shaped by how they form internal attributions (e.g., overconfidence) and external attributions (e.g., market conditions, herd behavior, or framing) in investment decisions (Hampson et al., 2021). These attributional tendencies influence how investors perceive and evaluate investment risks, thereby affecting the quality of their investment decisions. Investors' attributional judgments shape the way they interpret market information, assess potential risks, and formulate investment choices. Therefore, differences in attribution patterns may lead to variations in risk perception and investment behavior among investors, making Attribution Theory an appropriate framework for examining the behavioral mechanisms underlying government bond investment decisions.

This study is important because government bond investment decisions are often perceived as rational, but in practice, investors could be influenced by various behavioral biases that can lead to suboptimal outcomes. By analyzing the role of behavioral biases in shaping investment decisions, this study enhances understanding of the psychological dynamics that influence investor behavior within the bond market. Furthermore, analyzing the mediating effect of risk perception provides a deeper understanding of the mechanisms through which it occurs and explores its potential as a protective factor mitigating irrational decision-making across generations. These findings are crucial not only for advancing academic knowledge but also for informing financial institutions, as well as educators in

orchestrating strategies to improve investor decision quality, promote market stability, and support financial inclusion.

METHOD

Population and Sample

This study selected government bond investors from private banking institutions with large market capitalization in Indonesia, as well as banks that act as intermediaries for government bond securities traders with a large absorption rate. In this study, the researchers applied the principle of purposive sampling, selecting respondents based on specific requirements tailored to the research objectives (Ahmad & Wilkins, 2025). The respondent criteria are as follows: (1) Customers who invest in government bonds/SBN (ORI, SR, FR, PBS, INDON, or INDOIS); (2) Having a government bond transaction volume of at least IDR 1 billion during the observation period or in the past year, as an indicator of active involvement in the bond market; and (3) Belonging to one of the categories of Generation X (born 1965-1980) and Generation Y/Millennials (1981-1996).

This study used two subsamples that differentiated the samples based on the generational gap. The subsamples were divided into two generations: Generation X and Generation Y/Millennials, a classification adapted from research by Maříková et al. (2025). In non probability sampling techniques where the population size is unknown, the sample size can be determined from the quantity of operational items measuring the variables (Hair et al., 2019). According to Hair et al. (2019), the ideal sample size in an indicator based model is at least 5 times the quantity of indicators (observed variables) used in the questionnaire. This study uses 43 question items (including 29 behavioral bias items, 5 risk perception items, and 9 investment decision items), so the minimum recommended sample size is $43 \times 5 = 215$ for each sub sample.

Data Collection Technique

This quantitative study employs interval level data. Responses to each item or statement in interval data range from very positive to very negative (Jopling, 2019). Based on its source, this study uses primary data with predetermined specifications, where the data is obtained and processed directly through observation and questionnaires (Walliman, 2021). Researchers use primary data to find solutions to the problems being studied. This study uses a Likert scale designed to describe how strongly a respondent agrees or disagrees

with a statement. The scale range used is 10, where a score of 1 indicates "completely disagree," while a score of 10 indicates "strongly agree."

Operational Definition of Variables

This study uses three variables: behavioral bias (independent variable), investment decision (dependent variable), and risk perception (mediator variable). The operational definition and operational items for each variable are shown in the table below.

Table 1 Operational Definition of Variables

Variables	Operational Definition of Variables	Dimension	Indicators	Sources
Behavioral bias	Behavioral bias refers to systematic patterns of irrational choices and judgments that deviate from standard rationality (Adil et al., 2022; Suresh, 2024).	1. Disposition effect	1.1. Reluctance to realize losses 1.2. Loss avoidance 1.3. Value preference 1.4. Quick loss selling 1.5. Winner holding	(Adil et al., 2022; Suresh, 2024)
		2. Herd mentality	2.1. Information processing 2.2. Bandwagon effect 2.3. Social groups	
		3. Heuristic driven bias	3.1. Anchoring bias 3.2. Representativeness 3.3. Overconfidence	
		4. Framing effect	4.1. Mental accounting 4.2. Endowment effect 4.3. Regret aversion	
		5. Cognitive illusion	5.1. Conservatism 5.2. Confirmation 5.3. Hind sight	
Investment decision	Investment decision is defined as the process of	1. Rate of return expectation 2. Statement of government 3. Satisfaction of trading frequency and volume		(Adil et al., 2022)

	selecting and allocating financial resources to one or more instruments with the aim of generating profit and growth (Pranajaya et al., 2024; Sachdeva & Lehal, 2024).	4. Past performance consideration 5. Feeling about the fundamental	
Risk perception	Risk perception is a subjective assessment of potential danger, in which individuals form beliefs about the characteristics and severity of a risk, often using intuitive judgment rather than pure scientific data (Manrai et al., 2024).	1. Absolute likelihood 2. Comparative likelihood 3. Conditional 4. Risk target 5. Severity 6. Affect 7. Controllable 8. Known Perceived outcome	(Kaufman et al., 2020)

Data Analysis Technique

The dataset collected is examined using SPSS (Statistical Product and Service Solutions) for statistical analysis. SPSS is a program that can be used for all types of statistical data analysis in the social sciences and business (George & Mallery, 2019). The analysis in this study was conducted using Path Analysis using the Baron & Kenny's Approach.

Validity measurements in the study were conducted by analyzing the factor loadings, and grouping components of the correlation matrix between indicator variables. Factor loading indicates the correlation between an indicator and the resulting factor. If the factor loading value is > .400 (a threshold considered acceptable for studies with sample sizes

greater than 200), it can be concluded that the indicator variable representing a construct is valid (Hair et al., 2019). Reliability testing is then conducted to ensure the research instrument is capable of producing consistent and bias free measurements, thus ensuring the data are trustworthy and reliable (Hair et al., 2019). An item is considered reliable if it has a Cronbach's alpha value > .700 (Hair et al., 2019). Meanwhile, the corrected item total correlation calculation is valid if the test result is greater than .400 (Hair et al., 2019).

Moreover, the classical assumption test was also conducted in this study as a prerequisite test, consisting of a series of analyses to verify and ensure the linear regression model used is consistent, free from problems, and free from bias (Saunders et al., 2019). Normality testing was performed using the Monte Carlo test by examining the significance value. As a rule of thumb, a significance level greater than .050 implies failure to reject the null hypothesis of normality, thereby indicating that the data are normally distributed (Saunders et al., 2019). Multicollinearity testing was performed using Collinearity Diagnostics by examining the tolerance and VIF (Variance Inflation Factor) values, the threshold used is a tolerance value of .100 or a VIF exceeding 10. Furthermore, heteroscedasticity testing can be performed using the Breusch Pagan test by examining the significance value. A significance level above .050 indicates that the regression model is free from heteroscedasticity (Saunders et al., 2019).

Hypothesis testing in this study uses path analysis techniques using Baron & Kenny's Approach (Baron & Kenny, 1986). The first step is to test the output path coefficient of Model I (the effect of Behavioral Bias on Investment Decisions). The second step is to test the output path coefficient of Model II (the effect of Behavioral Bias on Risk Perception). The third step is to test the output path coefficient of Model III (the effect of Behavioral Bias and Risk Perception on Investment Decision). The fourth step is to test the mediation of the Risk Perception variable on the influence of Behavioral Bias and Investment Division on government bonds. The following is a regression equation that includes the mediating variables in this study:

Model 1 (the effect of X on Y)

$$Y = \alpha_1 + \beta_1 X + \varepsilon_1$$

Model 2 (the effect of X on M)

$$M = \alpha_2 + \beta_2 X + \varepsilon_2$$

Model 3 (the effect of X and M on Y)

$$Y = \alpha_3 + \beta_3 X + \beta_4 M + \varepsilon_3$$

Note:

Y = Investment decision (dependent variable)

α = Constant (value of Y if X = 0; value of M if X = 0; value of Y if X and M = 0)

β = Beta coefficient (value of increase or decrease)

X = Behavioral bias (independent variable)

M = Risk perception (mediating variable)

ε = Error

The Sobel test was used in this study to determine the effect of intervening variables. The Sobel test is used to assess the magnitude of the indirect effect of an independent variable (X) on a dependent variable (Y) through a mediating variable (M). The indirect effect is obtained by multiplying the path coefficients of each relationship. The standard error of the coefficients a and b are denoted by Sa and Sb, respectively, and the standard error of the indirect effect is Sab (indirect effect). The Sobel test is calculated using the following formula:

$$z = \frac{a \cdot b}{\sqrt{b^2 s_a^2 + a^2 s_b^2}}$$

Where:

a = Coefficient of regression between behavioral bias and risk perception

b = Coefficient of regression between risk perception and investment decision

SEa = Standard error value associated with a

SEb = Standard error value associated with b

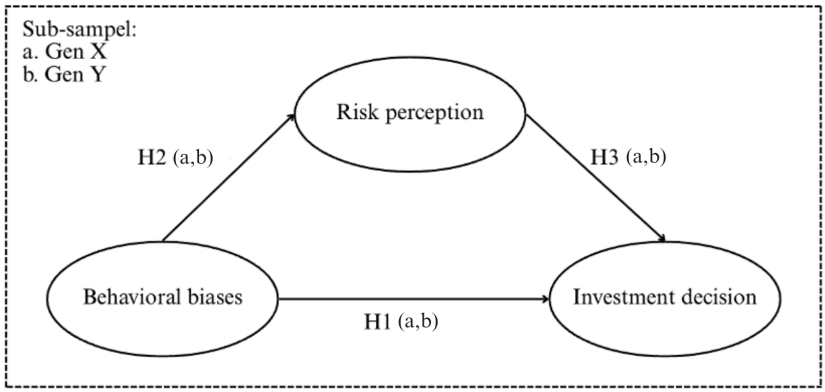


Figure 1 Research Model

RESULTS

Validity Test

In the validity test, 43 variable statement items were processed through two stages: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The EFA results showed that the item set for each variable met the EFA requirements, but one item, BB2, needed to be eliminated. Thus, the behavioral bias (BB) variable item set remained at 28 items: 9 items from the heuristic bias dimension; 5 items from the herding mentality dimension; 5 items from the disposition effect dimension; 4 items from the cognitive illusion dimension; and 5 items from the framing effect dimension. Meanwhile, the risk perception (RP) variable remained at 5 items, and the investment decision (ID) variable at 9 items. Thus, a total of 42 variable items passed the CFA stage.

Table 2 Validity Test Results

Variable	Item	Factor Loading	Remark
Behavioral Bias (BB)	BB1	.485	Valid
	BB3	.571	
	BB4	.564	
	BB5	.592	
	BB6	.544	
	BB7	.591	
	BB8	.534	
	BB9	.591	
	BB10	.534	
	BB11	.595	
	BB12	.610	

	BB13	.611	
	BB14	.565	
	BB15	.649	
	BB16	.610	
	BB17	.624	
	BB18	.568	
	BB19	.610	
	BB20	.624	
	BB21	.544	
	BB22	.636	
	BB23	.544	
	BB24	.636	
	BB25	.608	
	BB26	.622	
	BB27	.608	
	BB28	.622	
	BB29	.625	
	RP1	.900	
	RP2	.924	
Risk Perception (RP)	RP3	.935	Valid
	RP4	.903	
	RP5	.894	
	ID1	.789	
	ID2	.832	
	ID3	.837	
	ID4	.829	
Investment Decision (ID)	ID5	.831	Valid
	ID6	.771	
	ID7	.819	
	ID8	.853	
	ID9	.805	

In the CFA stage, all variable items met the criteria, so none were eliminated. All indicator items were deemed valid, as their factor loading values exceeded the minimum threshold of .400, which is considered acceptable for studies with sample sizes greater than 200 (Hair et al., 2019). Based on the results of the factor loading values at the CFA stage as shown in Table 2, the total number of variable items that passed the validity test and were declared valid at the CFA stage remained at 42 items.

Reliability Test

Table 3 Reliability Test Results

Item	Corrected Item Total Correlation	Cronbach's Alpha if Item Deleted	Cronbach's Alpha	Guttman Split Half Coefficient	Result
BB1	.440	.927			
BB3	.543	.925			
BB4	.529	.926			
BB5	.555	.925			
BB6	.502	.926			
BB7	.552	.925			
BB8	.516	.926			
BB9	.552	.925			
BB10	.516	.926			
BB11	.552	.925			
BB12	.576	.925			
BB13	.575	.925			
BB14	.528	.926			
BB15	.610	.925	.928	.758	Reliable
BB16	.537	.926			
BB17	.547	.926			
BB18	.501	.926			
BB19	.537	.926			
BB20	.547	.926			
BB21	.516	.926			
BB22	.586	.925			
BB23	.516	.926			
BB24	.586	.925			
BB25	.572	.925			
BB26	.584	.925			
BB27	.572	.925			
BB28	.584	.925			
BB29	.588	.925			
RP1	.844	.939			
RP2	.878	.933			
RP3	.894	.930	.949	.893	Reliable
RP4	.847	.939			
RP5	.835	.941			
ID1	.731	.933			
ID2	.783	.930	.938	.898	Reliable
ID3	.786	.930			

ID4	.776	.930
ID5	.780	.930
ID6	.709	.934
ID7	.765	.931
ID8	.809	.928
ID9	.750	.932

Based on the above, it can be seen that all variable items have a corrected item total correlation value greater than .400, and all studied variables have Cronbach's alpha and Guttman split half coefficient values greater than .700. Based on a series of reliability tests conducted, all items in the research instrument are reliable.

Classical Assumption Test

Normality testing was conducted using the Monte Carlo test by examining the significance value. If the significance value is >.050, it can be considered that the data is normally distributed (Saunders et al., 2019). Normally distributed data values occur when the data values cluster around the variable's mean value in a symmetrical pattern that forms a bell shaped frequency distribution (Hair et al., 2019). The table below shows a significance value of .068, indicating that the data in this study were normally distributed, as determined by the Monte Carlo normality test.

Table 4 Normality Test Results Monte Carlo

			Unstandardized Residual
	N		444
	Test Statistics		.041
	Asymp. Sig. (2 tailed)[c]		.066
Monte Carlo Sig. (2 tailed)[d]	Sig.		.068
	99% Confidence Interval	Lower Bound	.062
		Upper Bound	.074

Multicollinearity testing was conducted using Collinearity Diagnostics by analyzing the tolerance and VIF values. Based on the multicollinearity test results in Table 5, all independent variables in this study had tolerance values > .100 and VIF values < 10, indicating no signs of multicollinearity.

Table 5 Multicollinearity Test Results

Model		Collinearity Statistics	
		Tolerance	VIF
1	(Constant)		
	X1	.569	1.756
	Z1	.569	1.756
a. Dependent Variable: ID			

Heteroscedasticity testing was conducted using the Breusch Pagan Test by observing the significance value. The results of the heteroscedasticity test using the Breusch Pagan method in Table 6 show that all independent variables in the research model have a significance value >.050 and do not experience symptoms of heteroscedasticity.

Table 6 Heteroscedasticity Test Results Breusch Pagan Test

Coefficients[a]			
Model		t	Sig.
1	(Constant)	3.409	.001
	BB	-1.413	.158
	RP	1.076	.282
a. Dependent Variable: U2i			

Statistical Test

Table 7 Hypothesis Testing Results

Hypothesis	Relationship	Coefficient	t-value	Sig.	Result	Direction
H1 - All sample	BB → ID	-1.402	-14.500	.000	Supported	Negative
H2 - All sample	BB → RP	1.044	18.285	.000	Supported	Positive
H3 - All sample	RP → ID	.577	9.498	.000	Supported	Positive
H1 - Gen X	BB → ID	-2.047	-15.525	.000	Supported	Negative
H2 - Gen X	BB → RP	.895	12.152	.000	Supported	Positive
H3 - Gen X	RP → ID	.335	3.577	.000	Supported	Positive
H1 - Gen Y	BB → ID	-2.023	-16.319	.000	Supported	Negative

H2 - Gen Y	BB → RP	1.361	14.527	.000	Supported	Positive
H3 - Gen Y	RP → ID	.852	13.412	.000	Supported	Positive

On Table 8, the Sobel test results indicate that risk perception significantly mediates the relationship between behavioral bias and investment decisions. The indirect effect is supported by the Sobel test statistic of 8.404, which is greater than the critical value of 1.960, with a two tailed probability value of .000 ($p < .001$). This indicates that the mediation effect is statistically significant. Furthermore, the path from behavioral bias to risk perception is significant ($t = 18.285$; Sig. = .000), and the path from risk perception to investment decisions is also significant ($t = 9.498$; Sig. = .000). In addition, the direct effect of behavioral bias on investment decisions remains significant even after the mediator is included in the model ($t = -14.500$; Sig. = .000). Based on Baron and Kenny's mediation criteria, these results indicate a partial mediation effect.

Table 8 Sobel Test Results for the Full Sample

a	b	SE_A	SE_B	Sobel Z	One Tailed Probability	Two Tailed Probability
1.044	.577	.057	.061	8.404	< .001	< .001

The Sobel test results on Generation X subsample show that risk perception significantly mediates the relationship between behavioral bias and investment decisions as shown in Table 9. The Sobel test results for Generation X subsample show that risk perception significantly mediates the relationship between behavioral bias and investment decisions. The Sobel test statistic is 3.419, which exceeds the critical value of 1.960, with a two tailed probability value of .000 ($p < .001$). This confirms that the indirect effect of behavioral bias on investment decisions through risk perception is statistically significant. In addition, the relationship between behavioral bias and risk perception is significant ($t = 12.152$; Sig. = .000), and the relationship between risk perception and investment decisions is also significant ($t = 3.577$; Sig. = .000). Furthermore, the direct effect of behavioral bias on investment decisions remains significant after including the mediator in the model ($t = -15.525$; Sig. = .000). Based on Baron and Kenny's mediation criteria, the mediation effect can be classified as partial mediation.

Table 9 Sobel Test Results for Generation X

a	b	SE_A	SE_B	Sobel Z	One Tailed Probability	Two Tailed Probability
.895	.335	.074	.094	3.418	.000	.000

The Sobel test results on the Generation Y subsample show that risk perception significantly mediates the relationship between behavioral bias and investment decisions as shown in Table 10. The Sobel test results for the Generation Y subsample show that risk perception significantly mediates the relationship between behavioral bias and investment decisions. The Sobel test statistic is 9.800, which is significantly higher than the critical value of 1.960, with a two tailed probability value of .000 ($p < .001$). This indicates that the indirect effect of behavioral bias on investment decisions through risk perception is statistically significant. Furthermore, the relationship between behavioral bias and risk perception is significant ($t = 14.527$; Sig. = .000), while the relationship between risk perception and investment decisions is also significant ($t = 13.412$; Sig. = .000). In addition, the direct effect of behavioral bias on investment decisions remains significant even after the inclusion of the mediator variable ($t = -16.319$; Sig. = .000). According to Baron and Kenny's mediation criteria, the mediation effect on the Generation Y subsample can be categorized as partial mediation.

Table 10 Sobel Test Results for Generation Y

a	b	SE_A	SE_B	Sobel Z	One Tailed Probability	Two Tailed Probability
1.361	.852	.094	.064	9.799	< .001	< .001

Interaction Plot

The interaction test in Figure 2 was conducted to explore whether the relationships between behavioral bias, risk perception, and investment decisions differ between Generation X and Generation Y, although both groups showed similar overall statistical patterns in the mediation analysis. The previous mediation results indicated that behavioral bias significantly influenced risk perception, risk perception significantly influenced investment decisions, and risk perception partially mediated the relationship between

behavioral bias and investment decisions in both generations. However, the interaction plot reveals important differences in the magnitude and direction of these relationships across generations.

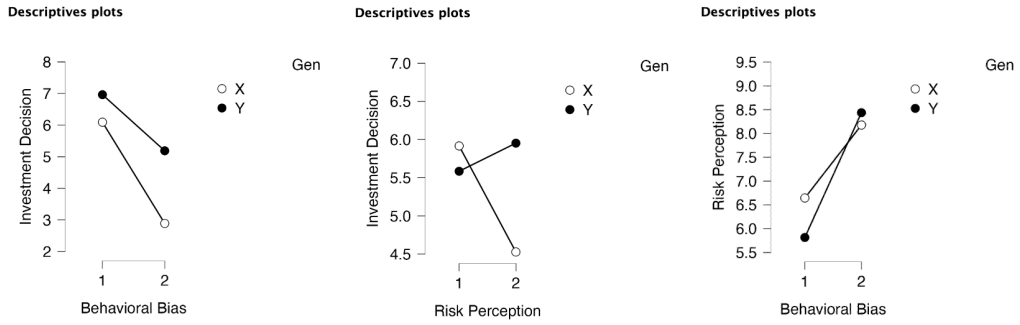


Figure 2 Descriptive Plots of Relationships Between Variables Across Generations

Based on the descriptive interaction plot in Figure 5, Generation X exhibits a sharper decline in investment decisions as behavioral bias increases compared to Generation Y, suggesting that Generation X tends to react more negatively to higher behavioral bias. In contrast, Generation Y exhibits a relatively more stable pattern of investment decisions, suggesting that younger investors may be more adaptable or tolerant of behavioral biases in investment situations. Furthermore, the interaction between risk perception and investment decisions also differs across generations. Generation X experiences a substantial decline in investment decision making at higher levels of perceived risk, while Generation Y shows a slight increase, suggesting that Generation Y may view higher risk as an opportunity for greater returns rather than a threat. The interaction plot between behavioral bias and risk perception further supports this interpretation. Both generations experience an increase in risk perception as behavioral bias increases, but the increase is steeper for Generation Y. This suggests that although younger investors are more aware of risk as behavioral bias increases, they do not necessarily reduce their investment decisions to the same extent as Generation X. Overall, the interaction analysis indicates that the mediating mechanisms are statistically similar across generations, but the behavioral responses and the intensity of the relationship differ significantly between Generation X and Generation Y.

DISCUSSION

The findings of this research show that behavioral biases have a significant negative influence on investment decisions among all respondents. This shows that the higher the level of behavioral bias an investor has, the lower the quality of investment decisions made in government bond instruments. Investors who are influenced by psychological tendencies such as overconfidence, optimism bias, or herd behavior are more likely to rely on emotion rather than objective financial analysis. As a result, investment decisions become less rational and potentially less than optimal because investors may underestimate uncertainty and ignore relevant risk considerations when allocating their funds. The present findings are aligned with the work of Ahmad and Shah (2022), which demonstrated the detrimental effect of behavioral biases on investment decision making. Consistent with this view, Almansour et al. (2023) contend that investors are prone to overreacting to market information while underestimating the likelihood of infrequent events, thereby increasing the risk of inefficient and suboptimal investment outcomes.

Results for Generation X show that behavioral biases significantly and negatively influence investment decisions. This suggests that as Generation X investors become increasingly influenced by psychological biases, the quality of their investment decisions tends to decline. Generation X investors generally have more investment experience and tend to rely heavily on personal judgment and past experience. However, this condition can also increase the tendency to be overconfident, causing investors to be less objective in evaluating investment opportunities and risks. As a result, behavioral biases can lead to less effective decision making in government bond investments. These findings support Ahmad & Shah (2022), who emphasize that overconfidence undermines the quality of investment decisions because investors tend to underestimate risks.

Findings for Generation Y also reveal that behavioral biases have a significant negative effect on investment decisions. This means that the stronger the behavioral biases experienced by Generation Y investors, the lower the quality of the investment decisions they make. Although Generation Y is generally more adaptive to technology and has greater access to financial information, they are also more exposed to market sentiment, social influence and digital investment trends (Lieanto & Kohardinata, 2025). This condition can strengthen emotional reactions and herd behavior, causing investment decisions to become less rational and more influenced by external factors. These results align with Ahmad and Shah (2022) and Almansour et al. (2023), who found that investors often overreact to certain issues and underestimate uncertainty, leading to inefficient decisions.

Other findings from this study show that behavioral bias has a significant positive effect on risk perception among all respondents. This finding suggests that stronger behavioral bias tends to increase investors' risk perceptions in government bond investments. Investors influenced by psychological factors such as overconfidence, anchoring, or herd behavior may become more emotionally involved in interpreting market information and uncertainty. Consequently, behavioral biases shape how investors evaluate and perceive potential investment risks, particularly in uncertain or highly dynamic financial market conditions. These results differ from those of Ahmad & Shah (2022), who found that behavioral biases negatively impact risk perception. Similarly, Almansour et al. (2023) argue that when investors follow market trends or observe many individuals investing in similar assets, they tend to perceive those investments as less risky. However, this study shows a positive relationship, which may be explained by the characteristics of government bond investments. In this context, investors who are more psychologically involved in investment activities may become increasingly sensitive to economic uncertainty, interest rate fluctuations, and market conditions, ultimately leading to higher levels of perceived risk.

The findings for Generation X indicate that behavioral biases significantly and positively influence risk perception. This suggests that higher behavioral biases among Generation X investors are associated with higher perceived investment risk. Generation X investors generally have more investment experience and financial exposure, which may make them more aware of potential market uncertainty and investment risk. When behavioral biases are present, these investors may become more cautious and wary of potential losses, especially in relatively conservative investment instruments such as government bonds. In the context of Generation X, behavioral biases can actually increase sensitivity to uncertainty because this generation has experienced various economic and financial cycles over time. These experiences can heighten awareness of market volatility and risk exposure, causing behavioral biases to increase rather than decrease risk perception.

The results for Generation Y also indicate that behavioral bias has a significant positive effect on risk perception. This finding implies that the stronger the behavioral bias experienced by Generation Y investors, the higher their perception of investment risk. Although Generation Y is often characterized as technologically adaptive and highly connected to financial information, constant exposure to digital news, market sentiment, and social media discussions can intensify emotional reactions to investment uncertainty. Consequently, behavioral bias may cause Generation Y investors to be more sensitive to

potential risks in government bond investments. Generation Y investors are highly exposed to rapid information flows and real time market updates, which can amplify concerns and uncertainty regarding investment outcomes.

The results of this research also portray that risk perception has a significant positive influence on investment decisions among all respondents. This suggests that investors with a higher awareness and understanding of investment risks tend to make better and more rational investment decisions in government bonds. Investors with stronger risk perceptions are generally more cautious in evaluating investment alternatives, considering potential returns and uncertainty before making a decision. In the context of government bond investments, higher risk perceptions can encourage investors to conduct more comprehensive analyses and adopt more cautious investment behavior, resulting in more informed investment decisions. These findings are consistent with Ahmad & Shah (2022), Wattanasan (2020), and Almansour et al. (2023) who concluded that increased risk perception improves investment decision making because investors become more aware of the consequences and uncertainties associated with investments.

The findings for Generation X reveal a significant positive relationship between risk perception and investment decisions, indicating that higher perceived risk is associated with more effective investment decision making. As investors with relatively longer financial and investment experience, Generation X individuals tend to understand the importance of balancing risk and return in investment activities. Therefore, a higher risk perception may encourage them to be more selective, analytical, and cautious before allocating funds to government bond investments. This finding aligns with Ahmad & Shah (2022) and Wattanasan (2020), who explain that a stronger risk perception improves the investment decision quality because investors become more aware of potential uncertainties and consequences. In the context of Generation X, investment experience and exposure to various economic conditions may strengthen their ability to interpret risk more carefully, thus encouraging more rational investment decisions.

The findings for Generation Y also indicate that risk perception has a significant positive influence on investment decisions. This means that Generation Y investors with higher levels of risk perception tend to make more cautious and rational investment decisions. Although Generation Y is often associated with a greater willingness to adopt new investment opportunities, awareness of investment risks still plays a significant role in shaping decision quality. Higher risk perception can encourage Generation Y investors to evaluate information more critically and avoid impulsive investment behavior influenced by

market trends or social media sentiment. These results are consistent with Ahmad & Shah (2022), Wattanasan (2020), and Almansour et al. (2023) who found that increased risk perception positively contributes to investment decision making because investors become more aware of investment uncertainty and risk exposure. For Generation Y, easy access to digital financial information can increase awareness of investment risks, thus supporting more informed and rational investment decisions even though they are highly exposed to market trends and technological developments.

Conclusion, Limitations, and Suggestions

Investment behavior is not determined solely by financial and economic fundamentals, but is also strongly conditioned by psychological processes and behavioral mechanisms that shape how investors interpret risk and make decisions. In government bond markets, both behavioral biases and perceived risk play a central role in explaining variations in investor behavior across generational groups. This study seeks to extend the behavioral finance literature by analyzing how behavioral biases influence investment decision making through risk perception as an intervening variable, while also investigating generational heterogeneity between Generation X and Generation Y investors. A comprehensive understanding of these behavioral mechanisms provides important implications for financial institutions, policymakers, and investment professionals in developing more targeted investment strategies and improving the effectiveness of financial communication.

The study's findings indicate that behavioral biases have a significant negative impact on investment decisions among all samples, including Generation X and Generation Y investors. This study also found that behavioral bias significantly influences risk perception among investors. Interestingly, the results showed a positive relationship between behavioral bias and risk perception across all samples and generational groups. This finding suggests that increased behavioral bias tends to increase investors' awareness and perception of investment risk. Furthermore, the findings also indicate that risk perception has a significant positive influence on investment decisions for all samples, Generation X and Generation Y investors. This result implies that investors with a higher awareness and understanding of investment risk tend to make more cautious and rational investment decisions. In the context of government bond investments, stronger risk perception supports more prudent investment behavior and contributes to better decision making quality.

Another important finding of this study is that risk perception successfully mediated

the relationship between behavioral bias and investment decisions across all sample groups. Mediation analysis showed that behavioral bias indirectly influenced investment decisions through changes in investors' risk perceptions. Although the mediation mechanism was statistically similar between Generation X and Generation Y, the psychological interpretation of risk differed significantly across generations. Generation X investors tended to process risk perceptions more conservatively, resulting in a stronger decline in investment willingness as behavioral bias increased. In contrast, Generation Y investors initially maintained relatively stable investment decisions despite increasing perceived risk, reflecting greater adaptability and tolerance for uncertainty. However, excessive behavioral bias ultimately undermined investment confidence even among younger investors.

Based on the findings of this study, financial institutions, banks, securities firms, wealth management divisions, and government agencies involved in the distribution of government bonds are expected to develop more adaptive and behaviorally oriented investment strategies. Investment decision making is influenced not only by rational financial considerations but also by behavioral biases and investor risk perceptions. Therefore, these institutions should strengthen their educational systems and behavioral finance based investment advisory services to help investors recognize psychological biases that may influence their investment decisions. Furthermore, these institutions are encouraged to formulate different communication and marketing strategies for different generations. Generation X investors tend to prioritize investment stability and risk aversion, while Generation Y investors demonstrate greater adaptability to uncertainty and market dynamics. Consequently, financial institutionsS must adopt a more personalized investment advisory approach tailored to generational characteristics, attitudes toward risk, and behavioral tendencies.

In spite of its contributions, this study has several limitations that should be acknowledged: (1) First, the study focuses exclusively on government bond investors, limiting the applicability of the findings to other investment instruments that may involve different levels of risk, return expectations, and investor characteristics; (2) Second, the use of a cross sectional research design constrains the ability to observe changes in behavioral biases over time, consequently, the study cannot distinguish whether the observed differences are attributable to generational characteristics or to changes associated with age, experience, and evolving market conditions. Future research is encouraged to adopt a wider scope of analysis to enhance the comprehensiveness of the study by involving a broader investor population and additional generations, such as Generation Z or Baby Boomers, to

gain a more comprehensive understanding of intergenerational investment behavior. Future studies could also compare different investment instruments, to identify whether the mediating role of risk perception and the influence of behavioral biases remains consistent across investment environments. Furthermore, future studies are recommended to adopt a longitudinal research design to better identify behavioral changes over time. The use of longitudinal data with a time lag of approximately 6-12 months or longer could help researchers distinguish whether differences in investment behavior are truly driven by generational gaps or by changes in investor behavior as individuals age and gain investment experience. Such an approach would provide deeper insights into how behavioral biases, risk perception, and investment decision making dynamically evolve across different stages of an investor's financial life cycle.

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